THE TONSILS AND THEIR RELATION TO THE DEVELOPMENT OF TUBERCULOSIS.*

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The faucial and pharyngeal tonsils are circumscribed lymphoid masses, the larger part of which is contained in a connective tissue capsule.[1] They are lined on their exposed, buccal surface by a columnar epithelium, changing to a squamous epithelium in the follicles dipping down deeply into the stroma of the tonsils. The epithelium shows numerous defects, which, according, to Stoehr, are physiological and meant for the transmigration of lymphocytes.

The tonsil itself consists of a stroma of connective tissue containing the blood and lymph vessels and within the meshes of the connective tissue net,—lymphocytes. In the depth of the follicles are germinating centers, where we find cells undergoing mitotic division. The newly generated lymphocytes wander either through the follicles into the buccal cavity or through the defects before mentioned into the deep layers of the tonsils and from there into the lymph vessels or blood circulation.

Wood[2] has demonstrated in a series of experiments the lymph drainage of the tonsils, by forcibly injecting into their tissue, aniline dyes. By doing so, he succeeded in injecting the vasa efferentia and showed, that the faucial tonsils drain into the superficial glands of the neck, and from there, into the deep anterior chain of the cervical glands, situated beneath the anterior border of the Sterno-Kleido-Mastoid muscle. The first gland of this chain he calls the tonsillar gland, which, if enlarged and pushed forward by other enlarged glands, is often mistaken for the submaxillary gland.

The pharyngeal tonsil drains into the retro-pharyngeal, suboccipital glands and from there into the deep posterior cervical glands, situated beneath the posterior boarder of the Sterno-Kleido-Mastoid muscle. Through anastomosis with retrosternal, peritracheal and bronchial glands infection can be carried directly to the pleura or the apices of the lungs[3]. The phyaryngeal tonsil is situated at the roof of the pharynx, at the entrance of the respiratory tract, and inspired air comes directly in contact with it[4]. The faucial tonsils are situated at the entrance to the digestive tract between the palatine pillars, which compress the tonsils in the act of swallowing.

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The physiological action of the tonsils consists in the production of lymphocytes. Goodale[5] of Boston, demonstrated in a series of experiments, how the tonsils react toward the introduction of foreign substances. He applied a solution of carmine to a number of tonsils, the removal of which had been decided upon. After allowing different periods of time to pass he removed the same, and came to the following conclusions. After a short time carmine can be seen in the follicle. Here and there a leucocyte can be found containing a particle of the pigment. By and by, particles of carmine pass through the physiological defects and are surrounded in the subepithelial layer by leucocytes, the nuclei of which are frequently undergoing division. Later on, the carmine enters the deeper layers of the stroma and can even be seen in the lymph vessels.

Bacteria are not absorbed so easily. But tubercle bacilli have been seen by Dmochowitz[6] and Wood[7] penetrating the epithelium. Bacilli may enter the tonsils either through their own ability of locomotion, or through growing into them in colonies. The probability that they will penetrate into the stroma or not, depends upon, 1. Their number; 2. Their virulence; 3 The individual power of resistance; 4. The condition of the tonsil. The epithelium seems to be the barrier which prevents the entrance of bacteria; as soon as this is destroyed, the door is opened wide to all sorts of infection.

It is the infection with the tubercle bacilli, which I have selected as my topic in this connection. We all know, of how frequent occurrence chronically enlarged cervical glands are in children. We used to speak of scrofulous or lymphatic, diathesis in this connection. Schlenker[8] and Krueckmann[9] have proved through extensive examinations, that a large percentage of these enlarged glands are due to tubercular processes. The infection of these glands is either caussed by a retrograde thrombosis of the lymph vessels originating in a pulmonary tuberculosis, or we have to look for the infection in the tonsils. For this reason they subjected all cases of adentis cervicalis to a thorough investigation of the condition of the tonsils, and found histologicallly, in a great number, tubercular lesions. They found the same pathological conditions as Dmochwitz and Wood have described, namely: A small number of tubercle bacilli in the follicles, where they penetrate the epithelium. The latter is either partly torn off the underlying connective tissue or is sometimes expelled en masse. In the subepithelial layers we find tubercles and giant cells. Concerning the frequency of tubercular lesions, the different investigators arrive at different results according to their method of research. One examines microscopically and regards every case as tubercular, where he finds tubercles and giant cells, although Pilliet[10] could not produce tuberculosis by inoculations in a series of pharyngeal tonsils containing tubercles and giant cells. On the other side, the inoculation method, that is, the introduction of suspirous tissue into the peritoneum of an animal, is often unreliable, for the following reasons:

1. On account of the individual power of resistance of the animal.

2. On account of the possibility of an already existing tuberculosis. Therefore, we must always show a lesion at the place of inocculation.

3. On account of the possibility of the presence of tubercle bacilli in the secretions, without actual disease of the organ.

4. On account of the possibility, that the fragment of tissue used may perchance not contain a tubercular lesion, while the organ is diseased.

Therefore the two methods should be combined to arrive at trustworthy results. We have to distinguish two forms of tonsillar tuberculosis, the acute and chronic.

The acute tonsillar tuberculosis is found as a part of miliary tuberculosis or as a metastatic process in the last stage of pulmonary tuberculosis. It causes great destruction of tissue in the form of irregular ulceration and the surrounding non-ulcerated tissue is studded with the yellow miliary nodules. In contrast with the acute form, the chronic is nearly always latent and without symptoms. The latter disease is either primary or secondary. In cases of pulmonary tuberculosis the autopsy showed very frequently tonsillar tuberculosis, although no symptom had indicated such condition during life. Schlenker, Schlesinger, Walsham, Ito, Dmochowitz, Krueckmann and Strassmann found, in 136 cases of pulmonary tuberculosis, 94 cases of tonsillar tuberculosis, or 69%.

The infection of the tonsils in the secondary cases takes place through the sputum. During the act of coughing the sputum containing tubercle bacilli is deposited on the surface of the tonsil and forced into the crypts during the act of swallowing, where the bacilli enter the stroma. That the secondary lesions are not more malignant and do not cause more destruction of tissue, may be explained by the fact, that the body has become immune to a certain degree by the previously existing pulmonary tuberculosis. Bandelier and Grawitz[12] have shown through their thorough observations, that the percentage of tonsillar tuberculosis increases in direct proportion to the amount of sputum. The first to observe, primary tuberculosis disease of the tonsils is Lermoyez[13]. After the removal of the pharyngeal tonsil one of his patients lost ground rapidly and developed pulmonary tuberculosis. This occurrence made him examine the pharyngeal tonsils of 32 apparently non-tuberculous patients by the inocculation method, and he then discovered tubercular lesions of their organs. Brindel, Baup, Ruge,[14] Dieulafoy,[15] Gottstein[16], Pluder and Fischer[17] corroborated his findings. Wood compiled from different sources 1671 cases with 88 primary tubercular tonsils or 5%.

How is the infection in these primary cases brought about? The pharyngeal tonsil situated at the entrance of the respiratory tractus receives the full impact of the inspired air. If once the tonsil is hyperplastic and has lost its epithelium through previous inflammatory conditions, it can readily be seen how the inspired tubercle bacilli have the right soil for their development and ravages. As soon as the pharyngeal tonsil has become so large, as to make nasal respiration impossible, mouth breathing takes its place and the infection of the faucial tonsils is then brought about in the same manner. But the most frequent course of the latter's infection is food, harboring tubercle bacilli. Orth[18] and Baumgarten fed animals with tuberculous tissue and after a short time always found tuberculosis of the cervical and bronchial glands, later also, of the mesenteric glands without a demonstrable intestinal lesion. After the tonsils have become infected, the disease may remain localized, or the lesions may heal in the usual manner; or the infection may travel on to the cervical and bronchial glands, or directly to the pleura; sometimes, a breaking down bronchial gland may empty its contents into a small bronchus and thus infect the apices of the lungs. On the other hand, infection may reach the lymph current and through that avenue the general circulation and so cause a general miliary tuberculosis. One observer found, also, that infected retropharyngeal glands involved the cervical spinal column and so caussed a Pott's disease.

We have to lay stress on the fact, that the chronic tuberculosis of the tonsils runs its course without symptom. If we consider, that the processes take place in the depths of the crypts or in the supepithelial tissue, we cannot be surprised, that we are unable to make a clinical diagnosis of these lesions.

I examined clinically in the Country Sanitarium for Consumptives of the Montefiore Home, the tonsils of 100 patients, and in spite of the fact established by the before mentioned invertigalions showing, that 69% must be suffering from tuberculosis of these organs. I was not able to make a different diagnosis than "atrophic, hypertrophic, catarrhal tonsils or sometimes, yellowish accumulations of secretion in the crypts." Bearing in mind the postulate of Bandelier and Grawitz, I had the patients classified according to the amount of their sputum, but could not demonstrate clinically an increase of pathological tonsils in proportion to the amount of sputum.

But if we know of the possibility of primary tuberculosis of the tonsils, we should not be satisfied in tubercular cervical adenitis to remove the glands. We should first exclude pulmonary disease and in its absence examine the tonsils. Should we find them in any way abnormal, it becomes necessary to remove them. Otherwise we may leave behind the *fons et origo* of the infection and may expose the patient to the risk of repeated operations.

Furthermore the removal of the tonsils should be radical, as the lesions are situated in the depths of the follicles, which almost reach the connective tissue capsule.

If, after such operation, the patient fails to pick up, we have to start immediately the dietetic hygienic treatment to prevent the further spread of a possible tuberculosis.

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The Treatment of Meniere's Disease by Means of Galvanism.

MARTIN SUGAR. *Arch. f. Ohrenh.*, Leipzig, Dec. 1904.

The author has obtained satisfactory results by the use of the galvanic current in the following manner. A large cathode is applied to the back of the neck and a smaller anode to the tragus on the affected side. A current of 1-20 milliampere is gradually increased to 5 milliampere and maintained for five minutes.

YANKAUER.